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Industrial Production and the Hand Process: Making a Bridge

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I am a weaver, a dyer, an artist, and an educator. I speak to you today from the perspective of a maker because it is from the process of making that I have researched and learned what I know about *taiten shibori*.

My own work has been defined for the last number of years by an original process that I call *woven shibori*. The genesis of that process was the introduction to stitched or *nui* shibori. As I made hand stitches into a piece of cloth in preparation for making a resist for dyeing, I realized that a weaver has the ability to place those stitches into the cloth during the construction. Weaving is a more efficient process than hand stitching and one that utilizes the woven structure to develop a somewhat controlled vocabulary of patterned resist in the cloth. When constructing a woven shibori, a supplemental warp or weft thread is woven on a ground cloth. That supplemental thread usually follows a structured pattern and is then used to gather the cloth, either in a warp of weft direction to form a resist for dying, shaping, burning, or other process.

This exploration has challenged all that I know about weaving: it has led me to explore and refine my knowledge of woven structure, dyeing, materials, and process focusing always on that relationship to the woven shibori process. I have developed an extensive vocabulary of woven pattern resist and alternative applications of the process and I have combined materials in ways that would only be possible for a hand weaver.

There is a historical reference to woven shibori from early 20th century Japan: *Taiten* shibori. It is a plain-woven fabric that utilizes heavier warp threads spaced across the width of the warp. These heavier threads are part of the plain-weave structure. Once the cloth is removed from the loom these heavier threads are gathered to compress the cloth and create a resist. The cloth is dyed, creating a small all-over pattern and then the heavier gathering threads are removed, leaving spaces in the cloth where the threads had been.

Taiten shibori was created to honor the Taisho Emperor who reigned from 1911 through 1925. It was likely invented by an artisan of Arimatsu, influenced by the industrialization of textiles and weaving that was so prevalent in Japan at that time. There is evidence that there was still some production of the cloth into the 1960's and 1970's. I have read that the technique was based on *nui* shibori where the cloth is stitched into precise vertical rows to make pleats. I do wonder about that reference, as the thought process is so completely different. I am more apt to think that *taiten* was made to take advantage of the opportunity of industrial production and the need to make patterned fabric more quickly.

Figure 1. *Taiten shibori, 1930's – 1960's, author's collection.*

Historically, the fabric was woven as a balanced plain weave, using fine cottons for both warp and weft. The sett of the warp ranged from approximately 56 to 64 ends per inch. The finest piece I have analyzed was made with a singles cotton (approx. a 40/1) in both warp and weft and a sett of 64 ends per inch. Heavier, very tightly twisted, and possibly waxed warp threads were inserted at intervals ranging between 14 and 50 warp threads. The variation in the space between these gathering threads altered the resultant dyed pattern. When threads were spaced close together, the resist was greater, preserving more of the original white cotton. When they were further apart, the resist was less, allowing more dye to penetrate the cloth. Rhythmic patterns were formed by changing the distance between the gathering threads in a single piece of cloth.

When the heavy gathering threads were removed from the cloth after dyeing, the perfect plain weave was interrupted as two threads in identical weaving position were left next to each other. When the cloth was new and un-used the removal of the threads left a distinct space in the cloth. As the cloth was used and repeatedly washed, the threads relaxed more, filling in the space with double warp threads.

There is an important difference between the two different types of woven shibori resists: my own process of *woven shibori* and *taiten*. My *woven shibori* resists are made from supplemental warp or weft threads that pass over and under a woven ground. The supplemental threads are gathered in order to form a resist for dyeing or shaping. When they are ultimately removed a perfect plain weave with no interruptions remains.
On the other hand, *taiten shibori* resists are part of the plain-woven ground. Once they are gathered and ultimately removed, there is an interruption of the plain weave ground cloth.

As I developed structural variations on my own process of shibori on the loom, I puzzled over the fact that there was no such development of woven shibori in Japan. Traditional Japanese shibori: such as stitching, clamping folding and binding underwent extensive refinement. What was the reason that a woven resist was never explored beyond the plain weave of *taiten shibori*? My process of learning and comprehension comes from doing. So once I understood the mechanics of *taiten shibori*, the first thing I did was put a warp on the loom and weave it,

replicating the original as closely as possible. I put gathering threads into the warp and threw the shuttle back and forth to weave the plain weave and I was able to conclude quickly that *taiten shibori* is all about weaving plain weave. It could be done on two shafts and is not necessarily technical or skilled weaving. Once I had woven the cloth, it was much easier to understand why it never evolved into more elaborate patterning. That may have required different equipment and a different way of thinking. The weaving was simply a means to a particular type of resist patterning.

My next question was "why hadn't the weavers explored other design possibilities with *taiten shibori*?" It would have been a natural progression for even an un-skilled weaver to change threads in the ground cloth or to insert pattern threads in the weft direction to make checks, plaids, or other patterns. These are all variations that I accomplished with ease and success.

Taiten shibori was primarily woven on industrial looms. The weavers were not the shibori artisans or dyers, who were ultimately responsible for the resist pattern in the cloth. The fabrics were woven on looms with top warp beams carrying the heavier cotton threads used to gather the cloth. Only after the lengths of cloth came off the loom, did the fabrics go to the shibori artisans, where kimono lengths of 14 meters were gathered and dyed warp wise. *Nui* or stitched Shibori was always gathered weft-wise – a much easier task considering the width was only 35cm.

The fabric was gathered with the help of a frame. The heavy warps were threaded through the holes in the wooden spacer on the end of the frame and then a reed-like instrument was used to pull and squeeze the length of cloth, gathering it into a tight bundle. It's estimated that 12 meters of cloth would contract down to a mere 60 cm before it was dyed. Only fine cotton was used for the taiten shibori, resulting in a light summer-weight garment. And as a result the fabric itself was a bit fragile.

So the weaving was completely separate from the dyeing, true to the strict division of labor that has always existed in shibori production. There was room for creativity in the weaving only in the placement of the gathering threads and an occasional small stripe in the warp.

Figure 2. *Taiten shibori with stencil print, 1930's – 1960's, author's collection.*

Some of the variations I have collected or have discovered in the dyeing include:

- General immersion in indigo
- Direct application of dye: likely chemical dyes
- Striped warp threads
- Combinations of *taiten shibori* with stenciling
- Warp threads removed at different stages of the dyeing

But if the weaver and the dyer were part of the same thought process would it have been possible to integrate those two steps more completely? *Taiten* represented cooperation between industry and the craftsmen. Yet there was still a separation between the processes of design and execution that may have limited the design possibilities.

Until recently all of my weaving was done on 16 shaft dobby looms. I was presented with the opportunity of industrial production of my own *woven shibori* fabrics when The Oriole Mill, a small specialty textile mill in western NC, opened its doors in 2007. At an earlier time in my career I would have eschewed any process that I perceived as separating myself from the act of making my own cloth but now I find myself ready to embrace the technology of industrial production. I no longer feel the need to hand weave all the fabrics that I am making for shibori but, on the other hand, I don't want to remove myself from the designing of the cloth. So I have been learning both jacquard design and how to prepare a file for the industrial loom. Whether my fabrics are hand woven or machine woven, they are still gathered and dyed by hand.

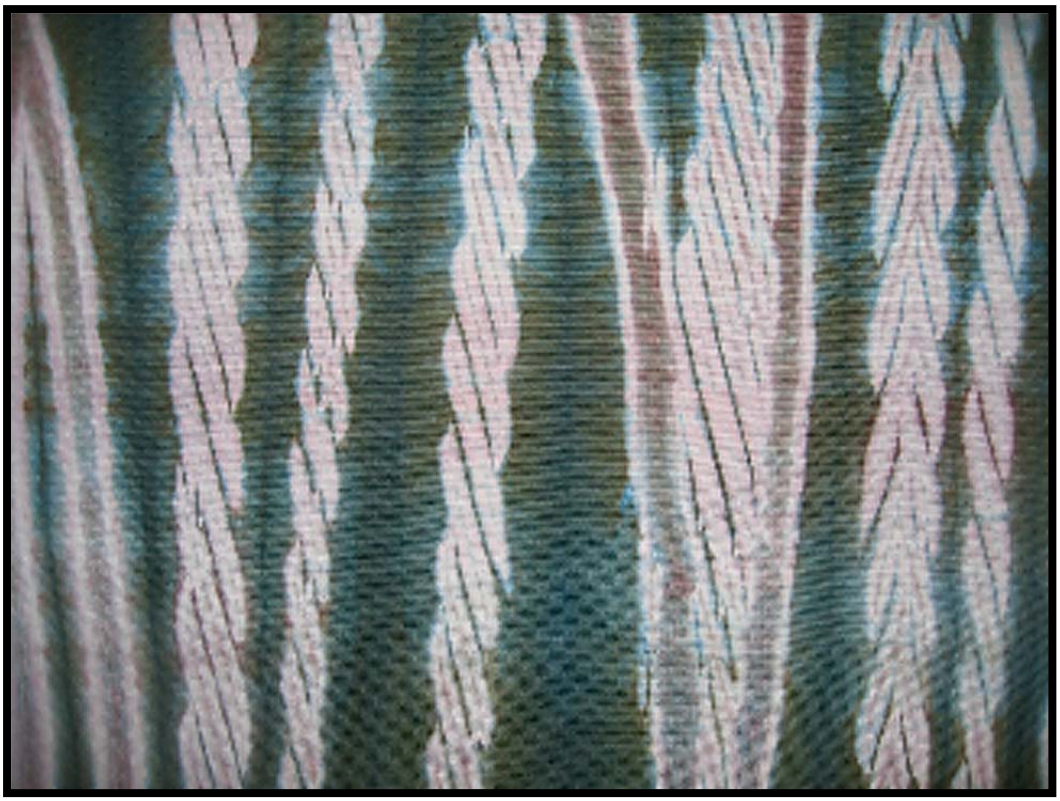

Figure 3. *Big Stripe, detail, woven shibori by author, 2008*.

Industrial weaving gave me the opportunity to:

- Design fabrics for shibori that were not restricted by the verticals and horizontals of the dobby looms, but instead to use more free-form patterns for the resist threads. The potential of designing for jacquard is unlimited and I have just begun to scratch the surface of what is possible. I have started by building on the dobby patterns that I have worked with and know well.
- Work with higher thread count than would have been practical on a hand dobby loom: cotton warps sett between 50 and 160 ends per inch.
- Make fabrics on a different scale than had been possible before: I have begun weaving pieces for "top of the bed" at 120 inches wide. The wide width and heavier pieces are posing new challenges to gathering pattern threads and dyeing on a larger scale.
- Combine the industrial with the hand. Fabrics that are woven in minutes on industrial machines still need to be gathered and dyed by hand. There is nothing industrial looking about the finished product when the final result reflects the imperfections of hand-dying.

An important distinction between traditional *taiten shibori* and my own industrially woven cloth is the fact that I am involved in the design and making of the cloth from beginning to end.

Industrial production is still not suitable for all the types of fabrics that I am interested in. I will always sample fabrics on the handloom, and it is still the only way to weave cloth that has special combinations of yarn in both the warp and the wefts, such as steel, and multiple fibers.

Technology and craft have always been intertwined: textile production was integral to the industrial revolution. *Woven shibori* has presented me with the perfect opportunity to explore that industrial revolution anew and combine the best of industry with the hand. There are other artists who come from the maker's studio and are exploring such combinations as well. Pauline Verbeek Cowart is weaving fabric at The Oriole Mill: merino wool that requires a hand finishing process. Wonsock Choi from NCSU, used the industrial 3D knitting machine to "knit" shibori threads into a garment. The cloth was gathered and dyed by hand.

The knowledge gained through direct experience with the hand produces new thinking and discoveries. What new opportunities lie ahead of textile artists and weavers who venture into meaningful partnerships with industry? I pose the question: If *taiten shibori* had benefited from the same artistic attention during the process of design and weaving all the way through to the finished product, would that art form have developed other variations, refinements and subtleties?